

This listing of the claims replaces all prior versions in the application.

Listing of Claims:

1. (Previously Presented) A method of flowably dispensing or processing dry powders from a device having a dry powder flow path, comprising:
generating a first non-linear vibration input signal, the first non-linear input signal comprising a carrier frequency modulated by a plurality of different selected frequencies that correspond to a first non-pharmaceutical dry powder formulation; and
applying the first non-linear vibration input signal to a portion of a dry powder flow path while the first dry powder formulation is flowing therethrough.
2. (Original) A method according to Claim 1, wherein the selected frequencies correspond to flow characteristic frequencies of the first dry powder, and wherein the generating step is carried out to cause the dry powder to flow in a substantially uniform fluidic manner without aggregation and/or agglomeration.
3. (Original) A method according to Claim 1, said method further comprising dispensing the first non-pharmaceutical dry powder through a dispensing port, wherein the dispensing step is carried out to serially dispense meted quantities of between about 10 μ g-10mg.
4. (Original) A method according to Claim 3, wherein each of the meted quantities are in substantially the same amount with a variation of less than about 10%.
5. (Previously Presented) A method of flowably dispensing or processing dry powders from a device having a dry powder flow path, comprising:
generating a first non-linear vibration input signal, the first non-linear input signal comprising a carrier frequency modulated by a plurality of different selected frequencies that correspond to a first non-pharmaceutical dry powder formulation;
applying the first non-linear vibration input signal to a portion of a dry powder flow path while the first dry powder formulation is flowing therethrough; and

providing a second non-pharmaceutical dry powder and mixing the first and second dry powders based on the generating and applying steps.

6. (Original) A method according to Claim 4, wherein the variation is less than about 5%.

7. (Original) A method according to Claim 1, wherein the non-linear input signal has a plurality of superpositioned modulating frequencies.

8. (Original) A method according to Claim 1, wherein the dry powder comprises a toner powder.

9. (Original) A method according to Claim 1, wherein the dry powder comprises a metal powder.

10. (Original) A method according to Claim 1, wherein the dry powder comprises a coating powder.

11. (Original) A method according to Claim 1, wherein the dry powder comprises a precious metal.

12. (Previously Presented) A method of flowably dispensing or processing dry powders from a device having a dry powder flow path, comprising:

generating a first non-linear vibration input signal, the first non-linear input signal comprising a plurality of different selected frequencies that correspond to a first non-pharmaceutical dry powder formulation; and

applying the first non-linear vibration input signal to a portion of a dry powder flow path while the first dry powder formulation is flowing therethrough,

wherein the input signal is derived from an evaluation of time between avalanches as detected in a mass flow analysis of the dry powder formulation.

13. (Original) A method according to Claim 12, wherein the derivation of the input signal converts time to frequency space to render frequency distribution data of the mass flow analysis of the dry powder formulation.

14. (Previously Presented) A method of flowably dispensing or processing dry powders from a device having a dry powder flow path, comprising:

generating a first non-linear vibration input signal, the first non-linear input signal comprising a plurality of different selected frequencies that correspond to a first non-pharmaceutical dry powder formulation;

applying the first non-linear vibration input signal to a portion of a dry powder flow path while the first dry powder formulation is flowing therethrough;

generating a second non-linear vibration input signal, the second non-linear input signal comprising a plurality of different selected signal frequencies that correspond to predetermined flow characteristics of a second non-pharmaceutical dry powder formulation; and

adjusting the non-linear input signal to apply a second non-linear vibration input signal to the flow path while the second non-pharmaceutical dry powder formulation is flowing therethrough, the second input signal being different from the first input signal.

15. (Original) A method according to Claim 1, wherein the applying step is carried out at a localized portion of a hopper in the flow path.

16. (Currently Amended) A method according to Claim 1, wherein the applying step is carried out by applying the non-linear vibration energy along a major portion of ~~the~~ a length of a hopper located in the flow path, the length of the hopper extending in the direction of flow.

17. (Original) A method according to Claim 13, wherein the non-linear input signal comprises a plurality of superimposed frequencies that are selected to represent a desired number of the most observed frequencies in the frequency distribution data.

18. (Original) A method according to Claim 1, wherein the applying step is carried out to concurrently apply vibrational energy to the flow path at multiple superimposed selected frequencies.

19. (Original) A method according to Claim 1, wherein the non-linear input signal comprises frequencies in the range of between about 10Hz to 1000kHz.

20. (Original) A method according to Claim 1, wherein the non-linear input signal comprises carrier frequencies in the range of between about 15kHz to 50kHz.

21. (Original) A method according to Claim 1, wherein the vibration energy input signal is based on electrical stimulation of a portion of the flow path.

22. (Original) A method according to Claim 1, wherein the vibration energy input signal is generated by mechanical stimulation of the dry powder.

23. (Original) A method according to Claim 1, wherein the vibration energy input signal is generated by electro-mechanical stimulation of the flow path and/or the first dry powder.

24. (Original) A method according to Claim 1, wherein the vibration energy input signal comprises imparting a high frequency motion onto a selected portion of a hopper in the flow path, with the outer bounds of the motion induced by the energy input of the hopper is small.

Claims 25-50 (Canceled).

51. (Previously Presented) A system of flowably processing and/or dispensing non-pharmaceutical dry powders from a device having a dry powder flow path, comprising:

means for generating a first non-linear vibration input signal, the first non-linear input signal comprising a carrier frequency modulated by a plurality of different selected frequencies that correspond to flow frequencies in flow characteristics of a first non-pharmaceutical dry powder formulation; and

means for applying the first non-linear vibration input signal to a dispensing device having at least one dispensing port while the first dry powder formulation is flowing therethrough; and

means for dispensing a first quantity of the first dry powder.

52. (Previously Presented) An apparatus for processing, dispensing and/or expelling non-pharmaceutical dry powders, comprising:

an elongate flow channel having a width, length, and depth, the flow channel having axially spaced apart inlet and outlet ports, wherein the elongate flow channel is configured to extend in an angular orientation of between about 10-75 degrees relative to the axial direction of flow;

a flexible piezoelectric layer configured to overlie the flow channel so that, in operation, the piezoelectric layer is able to flex upwardly away from the lowermost portion of the underlying flow channel;

a quantity of non-pharmaceutical dry powder positioned in the flow channel; and

a signal generator operatively associated with the piezoelectric layer, wherein, in operation, the signal generator is configured to output a vibratory signal comprising a carrier frequency modulated by a plurality of selected dry powder flow characteristic frequencies for flexing the piezoelectric layer which vibrates the dry powder in the elongate flow channel.

53. (Original) An apparatus according to Claim 52, wherein the flexible piezoelectric layer is a piezoelectric polymer, copolymer or derivative thereof.

Claims 54-60 (Canceled).

61. (Previously Presented) A method of flowably dispensing or processing dry powders from a device having a dry powder flow path, comprising:

generating a first non-linear vibration input signal, the first non-linear input signal comprising a carrier frequency modulated by a plurality of different selected frequencies that correspond to a first non-pharmaceutical dry powder formulation; and

applying the first non-linear vibration input signal to a portion of a dry powder flow path while the first dry powder formulation is flowing therethrough,

wherein the applying the first non-linear input vibration signal comprises applying associated signal voltage to the underside of piezoelectric material in communication with the dry powder.

62. (Previously Presented) A method according to Claim 1, wherein the first non-linear vibration input signal is generated using a plurality of superpositioned modulating frequencies.

63. (Original) A method according to Claim 62, wherein the number of superpositioned modulating frequencies is at least three.

64. (Original) A method according to Claim 63, wherein the number of superpositioned modulating frequencies is four.

65. (Original) A method according to Claim 64, wherein the four modulating frequencies are in the range of between about 10-15Hz.

66. (Previously Presented) A method of operating a dry powder filling system for dispensing non-pharmaceutical formulations of dry powder substances, comprising:

generating a vibratory signal comprising a carrier frequency modulated by a plurality of selected frequencies, wherein the selected frequencies corresponding to identified *a priori* flow characteristic frequencies of a non-pharmaceutical dry powder;

applying the generated vibratory signal to a dry powder in a dispensing flow path of a bulk powder enclosure; then

dispensing metered quantities of the dry powder from the dispensing flow path during the applying step.

67. (Previously Presented) A method according to Claim 66, wherein the vibratory signal is an amplitude modulated non-linear signal that superimposes the selected flow characteristic frequencies.

68. (Previously Presented) A method according to Claim 66, wherein the modulating flow characteristic frequencies comprise at least about three different frequencies in the range of between about 10Hz to 1000kHz.

69. (Previously Presented) A method according to Claim 68, wherein the carrier frequency is between about 15kHz to 50kHz.

70. (Previously Presented) A method of operating a dry powder filling system for dispensing non-pharmaceutical formulations of dry powder substances, comprising:

generating a vibratory signal comprising a carrier frequency modulated by a plurality of selected frequencies, wherein the selected frequencies corresponding to identified *a priori* flow characteristic frequencies of a non-pharmaceutical dry powder;

applying the generated vibratory signal to a dry powder in a dispensing flow path of a bulk powder enclosure; then

dispensing metered quantities of the dry powder from the dispensing flow path during the applying step,

wherein the *a priori* flow characteristic frequencies correspond to observed frequencies in an avalanche-analysis spectrum of the dry powder.

71. (Previously Presented) A method according to Claim 70, wherein the selected flow characteristic frequencies include a plurality of predominant observed frequencies

72. (Previously Presented) A method according to Claim 70, wherein the non-linear vibratory signal " x_{signal} " is a cumulative signal that comprises a sum of selected observed frequencies derived from an avalanche-analysis spectrum of the dry powder.

73. (Previously Presented) A method according to Claim 72, wherein the non-linear input signal " x_{signal} " is derived from the mathematical equation:

$$x_{\text{signal}} = xf_2 + xf_3 + xf_4 + \dots + xf_n$$

where $f_2, f_3, f_4, \dots, f_n$, respectively, correspond to most observed frequencies in an avalanche-based analysis spectrum of the dry powder and the parameter " x " used with f_2, f_3, f_4, f_n is a variable representing amplitude weight for a respective observed frequency.

74. (Previously Presented) A method according to Claim 73, wherein one or more of the weighted summed frequency components is multiplied by a mathematical phase adjustment.

75. (Previously Presented) A method according to Claim 73, wherein f_2, f_3, f_4 are the most observed frequencies in an avalanche-based analysis spectrum of the dry powder.

76. (Previously Presented) A method according to Claim 66, wherein serially dispensed meted quantities of the dry powder is about 5% or less.